

## CLAIMS

1. A method for preparing an oxygen radical-containing calcium aluminate film, characterized in that it comprises subjecting a powder of oxygen radical-  
5 containing calcium aluminate to thermal spraying.
2. The method according to Claim 1, wherein the oxygen radical content in the oxygen radical-containing calcium aluminate is at least  $10^{20} \text{ cm}^{-3}$ .
3. The method according to Claim 1 or 2, wherein the  
10 main mineral phase in the powder of oxygen radical-containing calcium aluminate is crystalline  $12\text{CaO} \cdot 7\text{Al}_2\text{O}_3$  ( $\text{C}_{12}\text{A}_7$ ).
4. The method according to Claim 3, wherein the  $12\text{CaO} \cdot 7\text{Al}_2\text{O}_3$  ( $\text{C}_{12}\text{A}_7$ ) is obtained by a solid phase reaction of a  
15 Ca source and an Al source in a mol ratio of Ca:Al being from 0.77:1 to 0.96:1.
5. The method according to Claim 4, wherein the solid phase reaction is carried out in a dry oxidizing atmosphere having an oxygen partial pressure of at least  
20  $10^4 \text{ Pa}$ , a steam partial pressure of at most  $10^2 \text{ Pa}$  and a temperature of from 1,200 to 1,415°C, or after the solid phase reaction, the system is maintained in such a dry oxidizing atmosphere.
6. The method according to any one of Claims 1 to 5,  
25 wherein the thermal spraying is carried out by plasma spraying.
7. A laminate having an oxygen radical-containing

calcium aluminate film formed on a substrate,  
characterized in that the oxygen radical-containing  
calcium aluminate film is formed by subjecting a powder  
of oxygen radical-containing calcium aluminate to thermal  
5 spraying.

8. The laminate according to Claim 7, wherein the oxygen  
radical-containing calcium aluminate film has a thickness  
of from 5 to 200  $\mu\text{m}$ .

9. The laminate according to Claim 7 or 8, wherein the  
10 oxygen radical content in the oxygen radical-containing  
calcium aluminate is at least  $10^{20} \text{ cm}^{-3}$ .

10. The laminate according to any one of Claims 7 to 9,  
wherein the substrate is a sintered body of zirconium  
oxide.